



A.D. 1844 N° 10,229.

S P E C I F I C A T I O N

OF

CHARLES WILLIAM GRAHAM.

—
OBTAINING CASTS OF ANATOMICAL AND
OTHER SUBJECTS.
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Obtaining Casts of Anatomical and other Subjects.

GRAHAM'S SPECIFICATION.

TO ALL TO WHOM THESE PRESENTS SHALL COME, I, CHARLES WILLIAM GRAHAM, of 20, King's Arms Yard, in the City of London, Merchant, send greeting.

WHEREAS Her present most Excellent Majesty Queen Victoria, by Her
5 Letters Patent under the Great Seal of Great Britain, bearing date at Westminster, the Eighteenth day of June, in the seventh year of Her reign, did, for Herself, Her heirs and successors, give and grant unto me, the said Charles William Graham, Her especial licence, full power, sole privilege and authority, that I, the said Charles William Graham, my exors, admors,
10 and assigns, or such others as I, the said Charles William Graham, my exors, admors, or assigns, should at any time agree with, and no others, from time to time and at all times during the term of years therein expressed, should and lawfully might make, use, exercise, and vend, within England, Wales, and the Town of Berwick-upon-Tweed, the Invention of "IMPROVE-
15 MENTS IN MANUFACTURING PATHOLOGICAL, ANATOMICAL, ZOOLOGICAL, GEOLOGICAL, BOTANICAL AND MINERALOGICAL REPRESENTATIONS IN RELIEF, AND IN ARRANGING THEM FOR USE," communicated to me by a certain Foreigner residing abroad; in which said Letters Patent is contained a proviso that I, the said Charles William Graham, shall cause a particular description of the nature of the
20 said Invention, and in what manner the same is to be performed, to be inrolled in Her said Majesty's High Court of Chancery within six calendar months next and immediately after the date of the said in part recited Letters Patent, as in and by the same, reference being thereunto had, will more fully and at large appear.

Graham's Improvements in Making Pathological, &c. Representations.

NOW KNOW YE, that in compliance with the said proviso, I, the said Charles William Graham, do hereby declare that the nature of the said Invention, and the manner in which the same is to be performed, are fully described and ascertained in and by the following statement thereof, that is to say:— 5

The Invention has for its object the Manufacture of Representations in relief of Pathological, Anatomical, Zoological, Geological, Botanical and Mineralogical Subjects, and arranging them for use, and consists of certain means and materials hereafter described for obtaining casts, which may be painted to represent the natural objects from which the same have been taken 10 with great exactness, the composition and materials used offer strength with lightness and impermeability to moisture, and are not liable to be injuriously acted on by varied temperatures or by climate. Hence the study of pathology and anatomy may be facilitated as subjects; these branches of science may be cast and painted from nature, and numerous copies obtained at comparatively 15 small cost, representing the various stages of a disease with great exactness. The Invention is applicable not only to representations of anatomical subjects, but also to those of zoological, geological, botanical, and mineralogical subjects. And in order that the Invention may be most fully understood and readily carried into effect, I will proceed to describe the best means I am acquainted 20 with for carrying it out.

In the first place, accurate moulds are to be obtained from the subject intended to be copied or represented in relief; this I believe to be best accomplished by means of plaster of Paris and although persons accustomed to take moulds in plaster of Paris will readily perform that operation where 25 the subject or thing to be copied is of a hard and resisting character, yet as the taking of casts from delicate and tender surfaces (such as are sometimes required to be copied, particularly in pathological and anatomical pursuits) is a matter of some difficulty, I will shortly explain the means resorted to by me in such cases. The surface of the diseased part which is to be 30 copied is, by means of a camel's hair pencil, to be very slightly covered with sweet oil, and in cases when the surface is too weak for such process, or partially fluid, such as ulcerous parts, the same are first covered with a fine skin, such as is used by goldbeaters; over this skin the oil is brushed lightly, and then, by means of a camel's hair brush, I apply plaster of Paris mixed very 35 fluid, and tinted with yellow ocre, applying only a very thin coat, and allowing the same to set, a second coat of plaster of less fluid is then applied, and when that is set a third or thick coating of plaster is applied. I would remark that it will be found that when the plaster has arrived at a certain degree

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of hardness, it will offer a sensible degree of heat to the touch; and it is important to state, that when obtaining casts from life, such heat might be injurious to the diseased parts, and therefore the cast is to be removed before such indication is given by the plaster, which a little observation in the use
5 of plaster by the operator will readily enable him to judge of. The cast or impression thus obtained is then to be placed in a stove, heated to about one hundred and twenty-two degrees of Fahrenheit, till the plaster becomes perfectly hard, when soap and water are to be applied, and rubbed over the inner surface by means of a soft brush, and the lather and froth produced are to be removed;
10 and by means of another soft brush, the surface is to be coated slightly with sweet oil, so as to remove any plaster which might otherwise remain on the surface. It will be evident that in some cases the requisite cast of plaster must be taken in more than one piece, as is now practised when taking casts in plaster of Paris. These casts thus obtained are then fit to be used for
15 obtaining models by filling the casts thus obtained with plaster of Paris, and when set and dried the cast is to be removed, the yellow tint of the original cast showing whether it comes away correct from the model thus procured. Stronger casts of plaster are to be obtained with care, but in cases where the requisite strength of casting can be attained in the first instance the intermediate models will not be necessary. The casts or moulds thus obtained
20 and treated on the interior surfaces as above explained, are now ready for use in the preparation of representations made of the composition hereafter described of the subjects from which the casts have been taken.

Casts from surfaces of a different nature will require more or less care
25 according to the delicacy of the surfaces copied; sufficient care should at all times be taken, according to the nature of the subject, so that the surface or surfaces thereof may be accurately taken in plaster, and impressions taken therefrom may correctly represent the configuration to the nicest detail of every part of the surfaces required to be represented. The composition
30 employed for obtaining the representations from the casts or moulds of plaster consists of dried carbonate of lime in fine powder 100 lbs., vegetable fibre to be reduced to pulp 2 lbs., animal or vegetable charcoal in fine powder (using animal by preference) 2 ounces, gelatine (strong glue) 5 lbs., copal varnish 1 lb., river water 30 lbs., Roman cement in fine powder 5 lbs., rye flour
35 1 lb. This composition is prepared and used in the following manner:—The glue is put into a vessel containing the water, and allowed to stand for some hours to soak, it is then boiled in the same water by means of a suitable bath over a slow fire. The rye flour having been well mixed with a portion of the water, so as to be in a liquid or milky state, is to be stirred into

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the melted glue. The vegetable pulp similarly wetted with another portion of the water is to be then added and stirred in. The copal varnish is next to be introduced and well stirred; then the charcoal is to be gradually added, continually stirring and intimately mixing the ingredients. The whole having been kept simmering during the admixture, and for two hours afterwards, is 5 now to be poured into a suitable earthenware or other vessel, and allowed to cool to a lukewarm heat. The dry carbonate of lime and Roman cement having been well sifted and blended together, to these is to be added the fluid mixture above described by successive portions, and continually stirred so as to produce a paste or composition, which is to be well beaten and 10 kneaded into a tough mass. A portion of the composition of the requisite size is now to be rolled out into a thin sheet, and the cast or mould of plaster of Paris being rubbed over on the inside by means of a camel's hair brush with finely powdered talc, the sheet of composition is to be placed into the mould, and damped on the surface with a slightly moistened sponge, then 15 pressed by the fingers into every part of the mould, so that an accurate impression may be taken capable when withdrawn fully to represent in relief the surface from which the cast in plaster of Paris has been taken. The composition having been accurately pressed into all parts of the mould a sheet of very strong unsized paper is to be coated on one side with strong paste made of 20 rye flour, and pressed over the surface of the composition in the mould, so as to come in close contact with it, then the mould and the composition therein are to be placed in a stove heated to about 120° to 130° Fahrenheit, until the cast in relief has dried sufficiently for removal, when it is to be removed from the mould, and again placed in the stove until it becomes 25 well dried and hard. The cast in relief thus obtained is to be fixed on a board or such like surface, which, according to the extent of relief of the cast, is to have a raised border and a cover, thus producing a case in the shape of a book, the back being made like that of a book, such borders being fixed to the cover or to the surface on which the impression is fixed; 30 the raised borders of this case may be hinged, so as to fold down. By this means the various subjects can be arranged so as to have the appearance of books, and where the subject is not in considerable relief more than one may be bound together into the form of a book. This mode of arrangement not only offers a convenient means of preserving the surfaces from injury and 35 dust, but also allows of the various subjects being arranged on shelves, as so many books. The impressions thus obtained representing subjects from life as well as other natural objects, when they are to be painted they are first prepared by two or more coatings of hot linseed oil, and again dried in

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the stove; they are then to be colored with oil color and varnished with great care, by copying the natural surfaces from which the casts have been obtained, the artist taking care that every (the most minute) part is painted correctly to represent the corresponding part of the surface from which the
 5 cast was taken. I would remark, that the composition above described offers the following advantages:—first, hardness with strength or toughness; second, the gelatine employed will not become injured or putrid, owing to the use of the charcoal; third, the colors used will not be absorbed; and, fourthly, the surfaces are not liable to injury by damp.

10 Having thus described the nature of the Invention, I would have it understood that I do not confine myself to the exact quantities herein described, though I believe them to be the best, or to the precise details, so long as the peculiar character of the Invention be retained; and I do not claim the obtaining castings in plaster of Paris, in order to take impressions therefrom.

15 But what I claim is the Manufacture of Pathological, Anatomical, Zoological, Geological, Botanical and Mineralogical Representations in Relief, by means of a composition such as is herein described, moulded, and capable of being painted. And I also claim the fitting up and arranging them for use as herein described.

20 In witness whereof, I, the said Charles William Graham, have hereunto set my hand and seal, this Eighteenth day of December, in the year of our Lord One thousand eight hundred and forty-four.

CHARLES WILLIAM (L.S.) GRAHAM.

25 **AND BE IT REMEMBERED**, that on the Eighteenth day of December, in the year of our Lord 1844, the aforesaid Charles William Graham, came before our said Lady the Queen in Her Chancery, and acknowledged the Specification aforesaid, and all and every thing therein contained and specified, in form above written. And also the Specification aforesaid
 30 was stamped according to the tenor of the Statute made for that purpose.

Enrolled the Eighteenth day of December, in the year of our Lord One thousand eight hundred and forty-four.

LONDON :

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